

REMARKS

Claims 34, 59, and 65 have been cancelled, and claim 66 has been added to this application. Thus, claims 33, 35-58, and 60-66 are now pending in this case.

The Examiner is thanked for renumbering claims 58-66 as 57-65.

Claims 33-65 of this application have been noted to conflict with claims in other applications that applicants have pending before the United States Patent and Trademark Office. Applicants respectfully submit that the claims in this application do not conflict with any of the claims that are present in those applications. To the extent that there is a conflict, however, applicants will either cancel those claims or file a Terminal Disclaimer to overcome any double patenting rejection that may exist in this case when it is otherwise in condition for allowance.

The drawings have been objected to under 37 C.F.R. § 1.83(a). Rather than amend the drawings in this application, applicants have elected to cancel claims 34, 59, and 65 from this application.

Claims 33, 35-46, 48-57, and 59 have been rejected under 35 U.S.C. § 103 as being unpatentable over U.K. Patent 2,072,516 to Simpson. Applicants respectfully submit that this rejection cannot be sustained.

Applicants' invention pertains to a filtering face mask 10 that comprises a mask body 12 that is adapted to fit over the nose and mouth of a wearer. The filtering face mask 10 also has an exhalation valve 14 that is attached to the mask body 10. The exhalation valve comprises a valve seat 26 and a single flexible flap 24. The valve seat 26 includes a seal surface 31, an orifice 32, and cross members 34 that extend across the orifice 32. The cross members 34 are recessed beneath the seal surface 32. The flexible flap 24 has a stationary or fixed portion 28 and a free portion and first and second opposing ends. The first end of the single, flexible flap is associated with the stationary portion 28 of the flap so as to remain at rest during an exhalation, and the second end 38 is associated with the free portion of the flexible flap so as to be lifted away from the seal surface 31 during an exhalation. The second or free end 38 also is located below the first end when the filtering face mask is worn on a person. A valve of this type of construction is commonly referred to as a flapper valve, as opposed to the commonly used button valves (see, for example, Figure 3 of Simpson), which have the whole peripheral edge of the flap free to be lifted from the valve seat. In applicants' flapper valve, the flexible flap would normally assume a flat configuration when no forces are applied to it, but the flap has a curved profile when viewed

from the side and is pressed towards the seal surface 31 in an abutting relationship with it when a fluid is not passing through the orifice.

The Simpson disclosure would not have rendered applicants' invention obvious to a person of ordinary skill for the following reasons.

Firstly, Simpson does not teach or suggest having cross members within an orifice of a flapper-style valve. Simpson discloses two valves, a flapper-style valve that is shown in Figure 2, and a button-style valve that is shown in Figure 3:

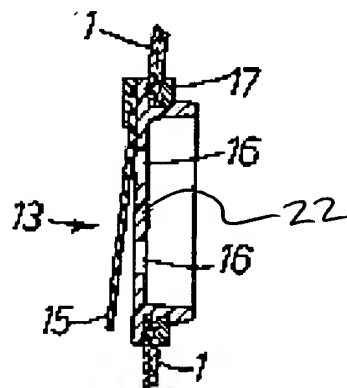


Fig. 2.

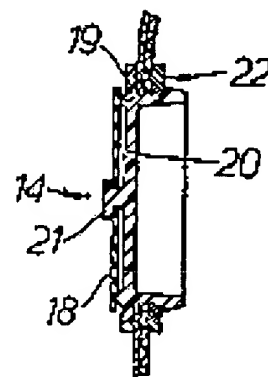


Fig. 3.

Simpson describes a valve seat that has valve openings 16 (lines 38-42) with an unidentified solid section somehow disposed in-between them, which solid section applicants' attorney has labeled above as part number 22. There is nothing in the Simpson disclosure, which tells the reader that part 22 is a cross member. The disclosure is so vague that a person of ordinary skill — or even one of extraordinary skill — could not determine if part 22 extends across an orifice.

Simpson also does not describe cross members that extend across an orifice in the Figure 3 valve 14. What Simpson does describe is a valve plate 20 that has openings in it (lines 51-56). The valve plate 20 is not further described in Simpson. If we assume, however, that the valve plate 20 does qualify as cross members, even though the description of it is minimal (and could possibly be nothing more than a series of small holes), there is nothing in Simpson that suggests using this technology in the valve 13 shown in Figure 2. If such would have been obvious to a person of ordinary skill, you would have at least expected Simpson to show this in Figure 2.

And if Simpson's valve plate 20 was constructed to be a plurality of cross members, the only purpose of the cross members would be to support the central hub 21. Simpson does not furnish the reader with any other reason for its use. And button-style valves are not particularly concerned with flap inversion problems (which would occur during an inhalation) since the flaps on button-style valves are centrally supported. Thus, there would be no reason to use plate 20 in valve 13 because there is no central hub 21 that needs to be supported. Valve 13 is a flapper valve — not a button-style valve. Flapper valves are not supported centrally. Therefore, the plate 20 would have no utility in valve 13. Simpson, therefore, when read as whole, provides very good evidence that the use of cross members would not have been obvious to a person of ordinary skill.

Secondly, Simpson does not teach or suggest a flap that is normally flat but is curved when disposed on the exhalation valve without having a fluid on the passing through the orifice. Simpson's valve 13 of Figure 2 has a slight curvature imparted to it, but this view is probably taken as a "snap-shot" when a fluid is passing through the orifice. Otherwise, the flap would be disposed in a planar configuration. If, however, Simpson's flap is pre-curved — that is, it takes on the configuration shown in Figure 2 when a fluid is not passing through the orifice — then the Simpson flap fails to show a flap that would normally be flat.

Thirdly, Simpson fails to teach or suggest a flexible flap that is pressed towards a seal surface when a fluid is not passing through the orifice. An expert in the field of respirators and respirator components, David M. Castiglione, in his February 2, 2001 Affidavit, has provided evidence that establishes that the valve 13 shown in Figure 2 of Simpson does not have its flap 15 *pressed* in an abutting relationship towards the seal surface when a wearer would be neither inhaling nor exhaling. Castiglione states that "there is nothing that can be discerned from Figure 2 or from the specification that would indicate that the flap is pressed towards the seal surface in its neutral position." Given the aligned relationship between the flap-retaining surface and the seal surface, there is no force or preload that would bias the flap to cause it to be pressed against the seal surface. As the above reproduced FIG. 2 illustrates, the flap 15 on valve 13 would at best be in mere contact with the seal surface when a wearer is neither inhaling nor exhaling.

In addition, Simpson does not indicate that the flap 18 in Figure 3 is pressed against the seal surface. Unlike the Figure 2 flap 15, the Figure 3 flap 18 is shown to be flush against the seal surface, but there is nothing to indicate that the flap is pressed against that surface.

Simpson's flap resides in a perfectly linear configuration when at rest, and there is nothing in the text that suggests that it is otherwise prestressed. Thus, flap 18 would appear to be in nothing more than mere contact with the valve seat 19.

In any event, Simpson's valve 14 is shown centrally mounted at a hub 21. Button-style valves like valve 14 do not have a peripheral edge that includes a stationary segment and a free segment. Nor do they have opposing stationary and free ends. In button-style valves, the whole peripheral edge is free to be lifted from the seal surface (Simpson, lines 58-61). These valves are disadvantageous in that the central mounting does not provide the large moment arm that flapper-style valves can provide. The limitations recited in applicants' independent claims under (b) (2) describe a flapper-style system and not a button-style system. Thus, valve 14 and its flap arrangement are not particularly pertinent to applicants' invention.

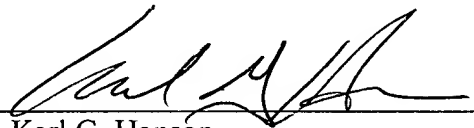
Fourthly, Simpson also fails to suggest the advantages that that applicants' invention can provide. As indicated above, the use of cross members can prevent the flap from inverting into the orifice without significantly hampering air passage through the orifice. This is particularly important to flapper-style valves where the flap is not stationary in the center. Unlike a button-style valve that is centrally mounted, the flap in a flapper-style valve could easily be inverted into the orifice. The added benefit that applicants' invention provides can be particularly advantageous to a person who wears a respirator for an extended period of time. Resistance to valve opening — such as could occur by having the substantially sized solid section 22 (see the above Figure 2 of Simpson) located directly in the path of the fluid flow — requires that the wearer supply more power to actuate the valve. The additional power that is needed to actuate the valve can pose comfort problems to the wearer. Applicants' invention can reduce these power requirements and hence improve wearer comfort, which in turn improves wearer safety because mask wearers are less likely to displace the mask from their face in a hazardous environment. Moreover, applicants' invention provides the benefit of achieving a low pressure drop value while preventing the influx of contaminants through the valve under any orientation of the valve. Simpson's valve provides protection to the wearer only at the most critical time — during an inhalation. When a wearer of the Simpson mask inhales, the flap becomes firmly pressed against the seal surface. But when the wearer is neither inhaling nor exhaling, and has their head tilted downward, the flap is not pressed towards the seal surface in an abutting relationship with it, and therefore there exists the possibility that contaminants can enter the mask

interior. Unlike Simpson, applicants teach persons of ordinary skill how to make a low pressure drop flapper-style exhalation valve that will preclude contaminant influx under all orientations of the mask. This is achieved by the use of cross members, the curved configuration of the flaps, and the flap being pressed against the seal surface under neutral conditions. The failure of the prior art to appreciate the benefits of applicants' invention, further established its nonobviousness.¹

In short, Simpson does not teach the construction of applicants' valve, and it does not appreciate the benefits that that construction invention can achieve. Under such circumstances, applicants' invention would not have been obvious to a person of ordinary skill within the meaning of 35 U.S.C. § 103. Accordingly, please reconsider the obviousness rejection in light of the above remarks and allow this application at an early date.

Registration Number	Telephone Number
32,900	651-736-7776
Date	10/12/01

Respectfully submitted,

By 
Karl G. Hanson

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¹ *In re Fine*, 5 USPQ2d 1596, 1600 (Fed. Cir. 1989).

VERSION WITH MARKINGS TO SHOW CHANGES MADE

Changes to Specification:

Page 7, line 22, between "exhalation." and the word "As" insert a new sentence:

When a wearer of a filtering face mask 10 exhales, exhaled air passes through the mask body 12 and exhalation valve 14. Comfort is best obtained when a high percentage of the exhaled air passes through exhalation valve 14 as opposed to the filter media of mask body 12. Exhaled air is expelled through valve 14 by having the exhaled air lift flexible flap 24 from valve seat 26. Flexible flap 24 is attached to valve seat 26 at a first portion 28 of flap 24, and the remaining circumferential edge of flexible flap 24 is free to be lifted from valve seat 26 during exhalation. The first portion (28) of the flexible flap (24) remains stationary during an exhalation and has a circumferential edge segment that may also remain stationary. As the term is used herein, "flexible" means the flap can deform or bend in the form of a self-supporting arc when secured at one end as a cantilever and viewed from a side elevation (see e.g., FIG. 5). A flap that is not self-supporting will tend to drape towards the ground at about 90 degrees from the horizontal.

Page 11, line 31, after "24" please insert --that is-- and at line 32, between "first" and "portion" insert --stationary--:

FIG. 5 illustrates a flexible flap 24 that is deformed by applying a uniform force to the flexible flap. Flexible flap 24 is secured at a first stationary portion 28 to a hold-down surface 46 and has for a second or free portion suspended therefrom as a cantilever beam. Surface 46 desirably is planar, and the flexible flap 24 is preferably secured to that planar surface along the whole width of portion 28. The uniform force includes a plurality of force vectors 47 of the same magnitude, each applied at a direction normal to the curvature of the flexible flap. The resulting deformation curve can be used to define the curvature of a valve seat's seal ridge 30 to provide a flexible flap that exerts a substantially uniform force upon the seal ridge.

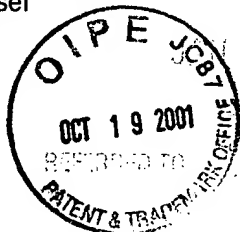


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COMMISSIONER FOR PATENTS
UNITED STATES PATENT AND TRADEMARK OFFICE
WASHINGTON, D.C. 20231
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APPLICATION NUMBER	FILING DATE	GRP ART UNIT	FIL FEE REC'D	ATTY. DOCKET NO.	DRAWINGS	TOT CLAIMS	IND CLAIMS
09/680,465	10/06/2000	3617	944	48317USA11.028	2	33	1

Office of Intellectual Property Counsel
3M Innovative Properties Company
PO Box 33427
St. Paul, MN 55133-3427



FILING RECEIPT



OC000000005635016

KGH

Date Mailed: 12/22/2000

Receipt is acknowledged of this nonprovisional Patent Application. It will be considered in its order and you will be notified as to the results of the examination. Be sure to provide the U.S. APPLICATION NUMBER, FILING DATE, NAME OF APPLICANT, and TITLE OF INVENTION when inquiring about this application. Fees transmitted by check or draft are subject to collection. Please verify the accuracy of the data presented on this receipt. If an error is noted on this Filing Receipt, please write to the Office of Initial Patent Examination's Customer Service Center. Please provide a copy of this Filing Receipt with the changes noted thereon. If you received a "Notice to File Missing Parts" for this application, please submit any corrections to this Filing Receipt with your reply to the Notice. When the PTO processes the reply to the Notice, the PTO will generate another Filing Receipt incorporating the requested corrections (if appropriate).

Applicant(s)

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Vaughn B. Grannis, Inver Grove Heights, MN ;
Harold J. Seppala, St. Paul, MN ;
Anthony B. Ferguson, Woodbury, MN ;

Continuing Data as Claimed by Applicant

THIS APPLICATION IS A DIV OF 08/240,877 05/11/1994
WHICH IS A DIV OF 07/981,244 11/25/1992 PAT 5,325,892
WHICH IS A CIP OF 07/891,289 05/29/1992 ABN

Foreign Applications

If Required, Foreign Filing License Granted 12/21/2000

Title

Fibrous filtration face mask having a new unidirectional fluid valve

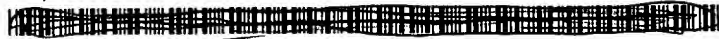
Preliminary Class

104

Data entry by : ABRANYOS, ASKALE

Team : OIPE

Date: 12/22/2000



IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

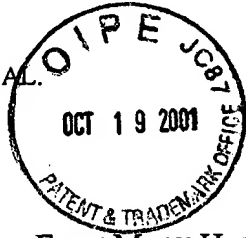
In re Application of:

DANIEL A. JAPUNTICH ET AL.

Serial No.: 09/677,915

Filed: October 3, 2000

For: FIBROUS FILTRATION FACE MASK HAVING A NEW UNIDIRECTIONAL FLUID VALVE



Group Art Unit:

DUE DATE(S) _____

Examiner:

ATTORNEY
DOCKETED

KGH
me

REQUEST FOR CORRECTED FILING RECEIPT

Commissioner for Patents
Washington, D.C. 20231

Dear Sir:

Applicants hereby request clarification and correction of the Filing Receipt dated December 22, 2000. The Filing Receipt states an incorrect Application Number of 09/680,465 and an incorrect filing date of October 6, 2000. The return postcard receipt for this application (copy enclosed) states an Application Number of 09/677,915 and a filing date of October 3, 2000, which is the correct filing date. Please issue a corrected Filing Receipt to match the information on the return postcard and change your records accordingly.

Dated this 5th day of January, 2001.

Respectfully submitted,

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Registration No. 32,900

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Pursuant to 37 C.F.R. § 1.8 I certify that this correspondence is being deposited on the date indicated below with the United States Postal Service as First Class Mail in an envelope addressed to:
Commissioner for Patents, Washington, DC 20231

Karl G. Hanson

Dated: January 5, 2001



Application Of: Daniel A. Japuntich et al.

Docket No.: 48317USA1L028

Serial No.:

Title: *Fibrous Filtration Face Mask Having A New Unidirectional Fluid Valve*

Pages of Specification (including Claims and Abstract): 29

No. of Claims:

Sheets of Drawings: 2

☒ Copy of Prior Declaration ☐ Assign. ☒ Certif. of Mailing

Amount charged to Deposit Account: \$944.00

Attorney (initials): KGH

Date: 10/3/00

Express Mail No.: EL 599 632 375 US

Enclosures: Transmittal Letter for Continuing Patent Application - Rule 1.53(b); copy of prior application with drawings; copy of prior Declaration; Preliminary Amendment; and 2 sheets of formal drawings (Figs. 1-7)

JC932 U.S. PTO

09/677915



10/03/00

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SG



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UNITED STATES PATENT AND TRADEMARK OFFICE
WASHINGTON, D.C. 20231
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APPLICATION NUMBER	FILING DATE	GRP ART UNIT	FIL FEE REC'D	ATTY. DOCKET NO	DRAWINGS	TOT CLAIMS	IND CLAIMS
09/680,465	10/06/2000	3617	944	48317USA11.028	2	33	1

09/677,915 10/03/2000

Office of Intellectual Property Counsel
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St. Paul, MN 55133-3427



FILING RECEIPT



OC000000005635016

KGH

pre

Date Mailed: 12/22/2000

Receipt is acknowledged of this nonprovisional Patent Application. It will be considered in its order and you will be notified as to the results of the examination. Be sure to provide the U.S. APPLICATION NUMBER, FILING DATE, NAME OF APPLICANT, and TITLE OF INVENTION when inquiring about this application. Fees transmitted by check or draft are subject to collection. Please verify the accuracy of the data presented on this receipt. If an error is noted on this Filing Receipt, please write to the Office of Initial Patent Examination's Customer Service Center. Please provide a copy of this Filing Receipt with the changes noted thereon. If you received a "Notice to File Missing Parts" for this application, please submit any corrections to this Filing Receipt with your reply to the Notice. When the PTO processes the reply to the Notice, the PTO will generate another Filing Receipt incorporating the requested corrections (if appropriate).

Applicant(s)

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Harold J. Seppala, St. Paul, MN ;
Anthony B. Ferguson, Woodbury, MN ;

Continuing Data as Claimed by Applicant

THIS APPLICATION IS A DIV OF 08/240,877 05/11/1994
WHICH IS A DIV OF 07/981,244 11/25/1992 PAT 5,325,892
WHICH IS A CIP OF 07/891,289 05/29/1992 ABN

Foreign Applications

If Required, Foreign Filing License Granted 12/21/2000

Title

Fibrous filtration face mask having a new unidirectional fluid valve

Preliminary Class

104



PATENT
Docket No.: 48317USA11.028

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of:

DANIEL A. JAPUNTICH ET AL.

Group Art Unit:

Serial No.: 09/677,915

Filed: October 3, 2000

Examiner:

For: FIBROUS FILTRATION FACE MASK HAVING A NEW UNIDIRECTIONAL FLUID VALVE

DUE DATE(S) _____
ATTORNEY K.G.H.
DOCKETED me

INFORMATION DISCLOSURE STATEMENT

Commissioner for Patents
Washington, D.C. 20231

Dear Sir:

In accordance with the continuing duty of candor and good faith that is to be demonstrated before this Office, enclosed are copies of the documents cited on the accompanying Form PTO-1449.

Applicants also bring to the Examiner's attention the following United States patent applications:

1. U.S. Serial No. 09/440,619, Japuntich et al., filed on November 15, 1999, entitled *Filtering Face Mask That Has A New Exhalation Valve*, which is a division of U.S. Serial No. 08/240,877, which is a division of U.S. Serial No. 07/981,244, filed on November 25, 1992, now U.S. Patent No. 5,325,892, which is a continuation-in-part of U.S. Serial No. 07/891,298, now abandoned.

2. U.S. Serial No. 09/442,082, Bowers, filed November 15, 1999, entitled *Uni-Directional Fluid Valve*, which is a reissue application of U.S. Patent No. 5,687,767, issued November 18, 1997.

3. U.S. Serial No. 09/678,488, Japuntich et al., filed October 3, 2000, entitled *Fibrous Filtration Face Mask Having A New Unidirectional Fluid Valve*.

4. U.S. Serial No. 09/677,636, Japuntich et al., filed October 3, 2000, entitled *Fibrous Filtration Face Mask Having A New Unidirectional Fluid Valve*.

5. U.S. Serial No. 09/677,637, Japuntich et al., filed October 3, 2000, entitled *Fibrous Filtration Face Mask Having A New Unidirectional Fluid Valve*.

6. U.S. Serial No. 09/678,580, Japuntich et al., filed October 3, 2000, entitled *Fibrous Filtration Face Mask Having A New Unidirectional Fluid Valve*.

7. U.S. Serial No. 09/678,579, Japuntich et al., filed October 3, 2000, entitled *Fibrous Filtration Face Mask Having A New Unidirectional Fluid Valve*.

8. U.S. Serial No. 09/678,581, Japuntich et al., filed October 3, 2000, entitled *Fibrous Filtration Face Mask Having A New Unidirectional Fluid Valve*.

A copy of the application for U.S. Serial Nos. 09/442,082 is enclosed for the Examiner's reference.

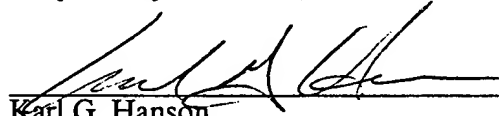
Copies of the applications for U.S. Serial Nos. 09/440,619, 09/677,636, 09/677,637, 09/678,581, 09/678,580, 09/678,579, and 09/678,488 (which are all divisions of U.S. Serial No. 08/240,877, filed May 11, 1994, which is a division of U.S. Serial No. 07/981,244, filed November 25, 1992, now U.S. Patent 5,325,892, which is a continuation-in-part of U.S. Serial No. 07/891,289, now abandoned) and U.S. Serial No. 08/240,877, have not been enclosed for the Examiner's reference because the application for these cases are the same as this application.

All of the above-noted applications are listed on the attachment to Form PTO-1449. Applicants request that these co-pending applications not be printed on the issued patent.

If a first Office Action has been mailed prior to the Certificate of Mailing date of this Disclosure Statement, please charge the fee for consideration of the Disclosure Statement, set forth in 37 C.F.R. § 1.17(p), to Deposit Account No. 13-3723.

Dated this 15th day of February, 2001.

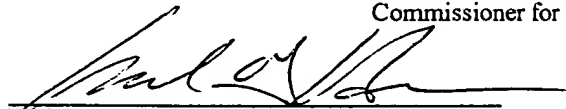
Respectfully submitted,



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Pursuant to 37 C.F.R. § 1.8 I certify that this correspondence is being deposited on the date indicated below with the United States Postal Service as First Class Mail in an envelope addressed to:
Commissioner for Patents, Washington, DC 20231


Karl G. Hanson

Dated: February 15, 2001

**INFORMATION
DISCLOSURE
STATEMENT
(Form PTO-1449)**

Atty. Docket No.: 48317USA11.028

Serial No.: 09/677,915

Applicant(s): Daniel A. Japuntich et al.

Filing Date: October 3, 2000

Group:

OCT 19 2001

U.S. PATENT DOCUMENTS

Examiner Initial	Document Number	Date	Name	Class	SubClass	Filing Date If Appropriate
	6,047,698	8/1998	Magidson et al.			
	5,687,767	11/1997	Bowers			
	5,509,436	4/1996	Japuntich et al.			
	5,346,375	9/1994	Akiyama et al.			
	5,325,892	7/1994	Japuntich et al.			
	5,255,687	10/1993	McKenna			
	5,036,806	8/1991	Rarick			
	4,981,134	1/1991	Courtney			
	4,974,586	12/1990	Wandel et al.			
	4,972,765	11/1990	Dixon			
	4,958,633	9/1990	Angell			
	4,934,362	6/1990	Braun			
	4,888,009	12/1989	Lederman et al.			
	4,873,972	10/1989	Magidson et al.			
	4,844,979	7/1989	Strobel et al.			
	4,838,262	6/1989	Katz			
	4,759,758	7/1988	Gabbay			
	4,749,003	6/1988	Leason			
	4,631,376	12/1986	Leone			
	4,630,604	12/1986	Montesi			
	4,456,016	6/1984	Nowacki et al.			
	4,453,544	6/1984	Silverthorn			
	4,414,973	11/1983	Matheson et al.			
	3,568,712	3/1971	Rinehart			
	3,191,618	6/1965	McKim			
	2,999,498	9/1961	Matheson			
	2,895,472	7/1959	Matheson			
	2,893,387	4/1959	Gongoll et al			
	2,874,093	2/1959	Matheson			
	2,864,394	5/1954	Hempel			
	2,320,770	6/1943	Cover			
	2,216,619	10/1940	Lehmberg			
	2,120,231	6/1938	Cover			
	1,867,478	7/1932	Stelzner			
	1,288,856	12/1918	Farr			
	1,287,419	12/1918	Perry			
	1,158,780	11/1915	Bolton			
	958,569	5/1910	Venner			

FOREIGN PATENT DOCUMENTS

	Document Number	Date	Country	Class	SubClass	Translation	
						Yes	No
	40 29 939	3/1992	Germany			X	
	1-242075 (corresponds to U.S. 4,934,362)	9/1989	Japan				X
	58-170465	11/1983	Japan			X	
	GB 2,072,516	10/1981	United Kingdom				

OTHER DOCUMENTS (Including Authors, Title, Date, Pertinent Papers, etc.)

EXAMINER	Date Considered
----------	-----------------

*Examiner: Initial if reference considered, whether or not citation is in conformance with MPEP 609; Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant.



Examiner
Initial

Related U.S. Applications

	U.S. Reissue Serial No. 09/442,082, Bowers, filed November 15, 1999
	U.S. Serial No. 09/440,619, Japuntich et al., filed November 15, 1999
	U.S. Serial No. 08/240,877, Japuntich et al., filed May 11, 1994
	U.S. Serial No. 09/678,581, Japuntich et al., filed October 3, 2000
	U.S. Serial No. 09/678,580, Japuntich et al., filed October 3, 2000
	U.S. Serial No. 09/678,579, Japuntich et al., filed October 3, 2000
	U.S. Serial No. 09/678,488, Japuntich et al., filed October 3, 2000
	U.S. Serial No. 09/677,637, Japuntich et al., filed October 3, 2000
	U.S. Serial No. 09/677,636, Japuntich et al., filed October 3, 2000

DO NOT PRINT

(21) Application No 8010808

(22) Date of filing
31 Mar 1980

(43) Application published
7 Oct 1981

(51) INT CL³ A62B 18/02

(52) Domestic classification
A5T CB

(56) Documents cited

GB 1432523

GB 1092378

GB 842766

GB 751223

GB 597960

GB 559064

(58) Field of search

A5T

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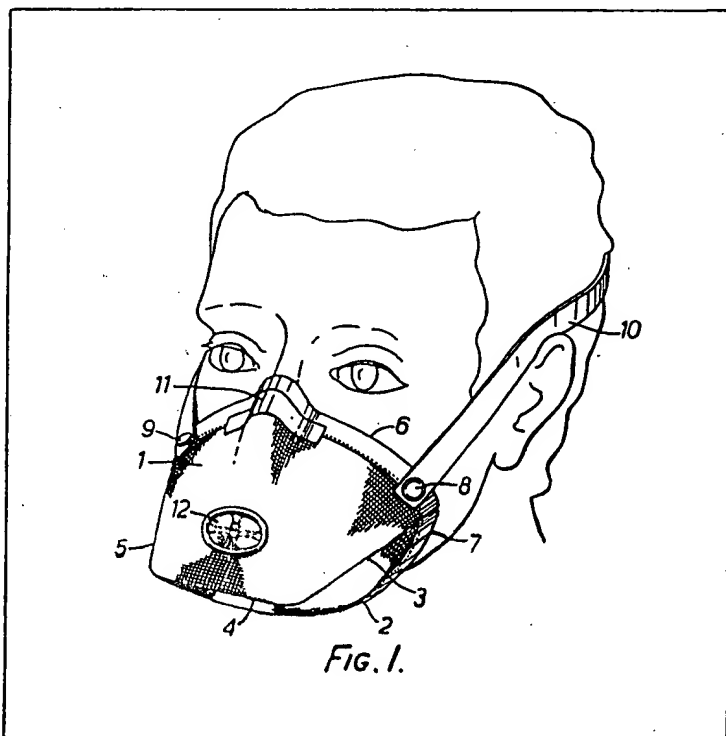
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(54) Improvements in and relating
to respiratory face masks

(57) This invention relates to a respiratory face mask in the form of a pouch (1,2) shaped to cover the nose and mouth of the wearer, the pouch being formed from filtration-effective sheet material and being provided with one or more exhalation valves (12).



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The drawing(s) originally filed was/were informal and the print here reproduced is taken from a later filed formal copy.

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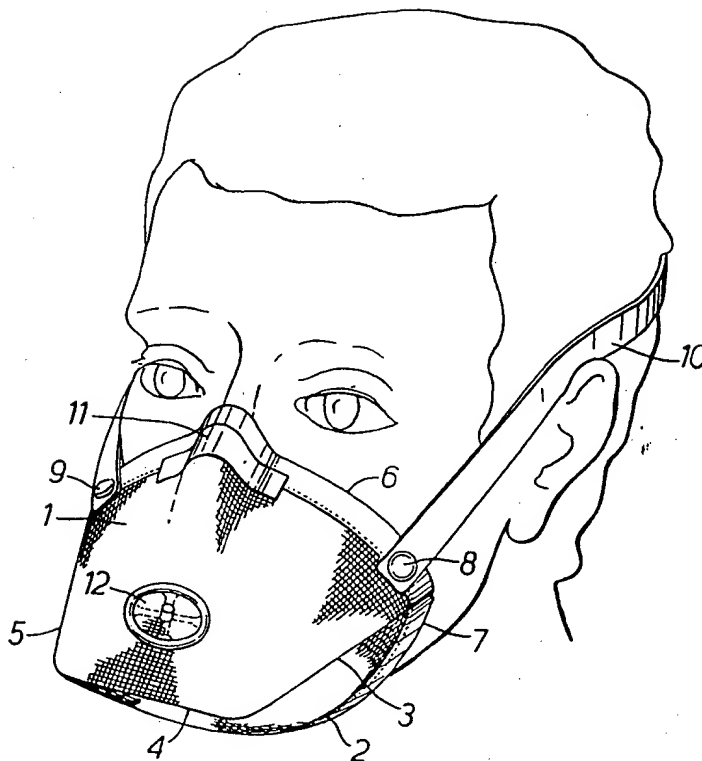


FIG. 1.

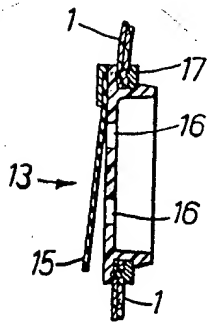


FIG. 2.

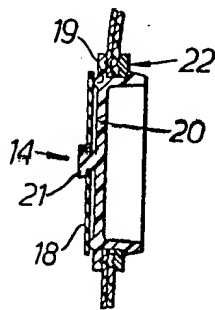


FIG. 3.

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SPECIFICATION

Improvements in and relating to respiratory face masks

The present invention relates to respiratory face masks.

Respiratory face masks have been proposed previously (see the Complete Specification of British Patent Application 16079/77 in the name of the Secretary of State of Defence) which are relatively light in weight, the mask being arranged, in use, to cover the mouth and nose of the wearer and being formed from one or more sheets of filtration-effective material. Charcoal cloth, that is to say a woven or non-woven cloth primarily composed of fibrous or filamental activated carbon, is a material which has been proposed for use in such face masks, such a material being especially suitable for use in filtering out gaseous or vaporous contaminants which may be present in the surrounding atmosphere. Such a mask may also be used for filtering out particulate contaminants for example by providing it with a thin layer of appropriate filter material or the mask itself may be made of such material.

Such masks have generally been found to be satisfactory. It has now been found, however, that during relatively long periods of use or when the wearer is working particularly hard, the resistance to inhalation afforded by the mask becomes undesirably high. It has further been found that this increase in inhalation resistance results from the material of the mask becoming saturated with water vapour, predominantly exhaled water vapour.

The present invention provides a respiratory face mask in the form of a pouch shaped to cover the nose and mouth of the wearer, the pouch being formed from filtration-effective sheet material and the mask being provided with one or more exhalation valves.

The incorporation of the or each exhalation valve prevents or materially reduces the build-up of water vapour in the filtration-effective material of which the pouch is made during exhalation by the wearer.

The or each valve can be fitted in any suitable position in the pouch and may, for example, be so fitted that when the mask is worn the valve is adjacent to the nose and/or the mouth of the wearer or alternatively so that it is below the mouth, for example, in a part of the mask which is arranged to fit under the wearer's chin.

To prevent inhalation of harmful atmosphere owing to leakage of the or each valve, the valve may be provided with an antechamber so arranged that, if the valve does leak in operation, the wearer inhales previously exhaled breath and not the harmful atmosphere.

The or each valve may be of any suitable

form and may, for example, be a flap valve or a diaphragm valve.

Although the sheet material may be made from any material which is filtration-effective, it is of advantage if it comprises cloth which may be woven or non-woven and, preferably, an activated charcoal cloth.

A single thickness of filtration-effective sheet material may be used to form the pouch but to increase its filtration qualities and to increase its life-time two or more layers which may be laminated of filtration-effective sheet material may be used.

Further, the sheet material may comprise two outer sheets (of, for example, cloth) and between those sheets a filtration-effective layer which may also be of sheet form (for example an activated charcoal cloth) or may comprise a filler material.

Excluding the exhalation valve or valves, the mask may be constructed as disclosed in the Complete Specification of British Patent Application No. 16079/77 to which attention is directed.

A facelet mask constructed in accordance with the present invention will now be described, by way of example only, with reference to the accompanying drawings, in which:

Figure 1 is a perspective view of the mask in position on the face of a wearer;

Figure 2 is a side view, in section, of one type of valve that can be incorporated in the mask shown in Fig. 1; and

Figure 3 is a side view, in section, of a second form of valve which can be incorporated in the mask shown in Fig. 1.

Referring to the accompanying drawings and first of all to Fig. 1, the mask is in the form of a pouch comprising two portions 1 and 2 which are joined together along meeting edges 3, 4 and 5.

Each of the portions 1, 2, is made up, at least in part, of a filtration-effective sheet material, preferably activated charcoal cloth. Each portion 1, 2 comprises a single sheet or two or more sheets of filtration-effective material. Each sheet is trapezoidal in shape when laid flat and the sheet(s) in the portion 1 are separate from the sheet(s) in the portion 2. Each portion 1, 2 has on one or both sides a co-extensive sheet of backing material, all the sheets being joined together, for example by stitching along the meeting edges 3, 4 and 5. The backing material is provided so that the mask retains its shape better in use and so that its strength and resistance to wear is increased.

As an alternative to using sheets as described above, double-layer sheets which are trapezoidal in shape can be used, each double layer sheet being formed by folding over on itself a sheet which, when laid flat, is in the form of a regular hexagon.

Further, the or each trapezoidal sheet in the

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portion 1 may, instead of being separate from the or a corresponding sheet in the portion 2, as described above, be formed integrally therewith, the sheets being joined along a common line 4. In that case the or each sheet is folded about the line 4 and the sheets are then joined along the edges 3 and 5.

At the face-contacting edges 6 and 7, the layers of material are folded back and stitched or otherwise joined together to prevent the material from fraying in that region. At the corners of the mask adjacent to the face-contacting edges 6 and 7 press-studs 8 and 9 serve to secure a strap 10 to the body of the mask to hold the mask on the face of the wearer. Adjacent to one face-contacting edge 6 and running for a short distance on either side of the centre point of the edge is a deformable strip of readily deformable metal, for example aluminum, which is held in place by a covering strip 11 of adhesive tape. Alternatively, the strip of metal may be held in place, for example by stitching, between two sheets or layers of filtration-effective material. In this case, the metal strip may, before it is fitted, be covered—at least along its edges—with a foamed plastics material to prevent the strip damaging the filtration-effective material.

Provided in the portion 1 of the mask, although it could instead be provided in the portion 2, is an exhalation valve 12 (two or more such valves could be provided).

The valve 12 is a flap valve 13 as shown in Fig. 2 or a diaphragm valve 14 as shown in Fig. 3, the valve of Fig. 3 being that shown in position in the mask of Fig. 1.

The flap valve 13 of Fig. 2 comprises a flexible circular flap member 15 of, for example, plastics material, which is arranged to cover and closed valve openings 16 during inhalation and to flex away from those openings during exhalation. To allow flexing of the flap member 15 a part of its peripheral portion, a segment of the flap member, is fixed in position, the remaining part of the flap member being left free. The valve is fitted in an aperture in the mask and is held in place by a retaining ring 17 which engages the edge portion of that opening to provide an effective seal.

The diaphragm valve 14 shown in Fig. 3 comprises a flexible circular valve member 18, preferably made of rubber, which is so arranged that during inhalation it engages with a circular knife-edge valve seat 19 and during exhalation it flexes away from that seat to allow air to pass through valve openings, not shown, in a valve plate 20. To allow flexing of the valve member 18 it is mounted on the valve plate by a hub 21, the remaining part of the valve member being left free. As in the case of the valve shown in Fig. 2, the valve shown in Fig. 3 is mounted in an opening form in the mask and is secured to the mask by a retaining ring 22.

The mask described and illustrated above is especially suitable for filtering out gaseous or vaporous contaminants but the filtration-effective material may be such that the mask can be used to filter out particulate contaminants. For example, the filtration-effective material may include a layer of appropriate filter material or it may be constituted by such a material.

CLAIMS

1. A respiratory face mask in the form of a pouch shaped to cover the nose and mouth of the wearer, the pouch being formed from filtration-effective sheet material and being provided with one or more exhalation valves.
2. A face mask as claimed in claim 1, in which the or each valve is so fitted in the mask that when the mask is worn the valve is adjacent to the nose and/or the mouth of the wearer.
3. A face mask as claimed in claim 1, in which the or each valve is so fitted in the mask that when the mask is worn the valve is below the mouth of the wearer.
4. A face mask as claimed in claim 1 or claim 3, in which the or each valve is in a part of the mask which is arranged to fit under the chin of the wearer.
5. A face mask as claimed in any one of claims 1 to 4, in which the or each valve is provided with an antechamber so arranged that, if the valve leaks in operation, the wearer inhales previously exhaled breath and not harmful atmosphere.
6. A face mask as claimed in any one of claims 1 to 5, in which the or each valve is a flap valve.
7. A face mask as claimed in any one of claims 1 to 5, in which the or each valve is a diaphragm valve.
8. A face mask as claimed in any one of claims 1 to 7, in which the sheet material is cloth which may be woven or non-woven.
9. A face mask as claimed in any one of claims 1 to 8, in which the sheet material is an activated charcoal cloth.
10. A face mask as claimed in any one of claims 1 to 9, in which a single thickness of filtration-effective sheet material is used to form the pouch.
11. A face mask as claimed in any one of claims 1 to 9, in which two or more layers of filtration-effective sheet material are used to form the pouch.
12. A face mask as claimed in claim 11, in which the layers are laminated.
13. A face mask as claimed in any one of claims 1 to 9, in which the sheet material comprises two outer sheets and between those sheets a filtration-effective layer.
14. A face mask as claimed in claim 13, in which the two outer sheets are cloth.
15. A face mask as claimed in claim 13 or claim 14, in which the filtration-effective layer

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is of sheet form.

16. A face mask as claimed in claim 13 or claim 14, in which the filtration-effective layer comprises a filler material.

5 17. A face mask as claimed in any one of claims 1 to 16, in which the pouch is constituted by two portions which are joined together along corresponding meeting edges, each portion being trapezoidal in shape when
10 laid flat.

18. A face mask as claimed in claim 17, in which each portion is formed separately.

15 19. A face mask as claimed in claim 17, in which the two portions are formed from a single member which is folded to form one edge of the pouch, the other edges being subsequently joined together.

20. A face mask as claimed in any one of claims 17 to 19, in which each portion comprises a single sheet or two or more layered sheets of filtration-effective material.

21. A face mask as claimed in claim 20, in which the or each sheet is a double-layer sheet, each double layer sheet being formed
25 by folding over on itself a sheet which when laid flat, is in the form of a regular hexagon.

22. A face mask as claimed in any one of claims 17 to 21, in which the, or at least one of the valves is provided in one of the said
30 portions.

23. A face mask as claimed in any one of claims 1 to 22, in which the or each valve is sealingly secured in an aperture in the mask.

24. A respiratory face mask substantially
35 as herein before described with reference to, and as shown in the accompanying drawing.

25. A respiratory face mask as claimed in any one of claims 1 to 23, the valve being substantially as hereinbefore described with
40 reference to and as shown in Fig. 2 or Fig. 3.

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In re Application of:

DANIEL A. JAPUNTICH

Serial No.: 09/677,915

Filed: October 3, 2000

Group Art Unit:

Examiner:

DUE DATE(S) _____

ATTORNEY KGH
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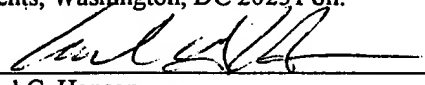
For: FIBROUS FILTRATION FACE MASK HAVING A NEW UNIDIRECTIONAL FLUID VALVE

CERTIFICATE OF MAILING

I hereby certify that this correspondence is being deposited with the United States Postal Service as First Class Mail in an envelope addressed to: Commissioner for Patents, Washington, DC 20231 on:

May 14, 2001

Date


Karl G. Hanson

SUPPLEMENTAL PRELIMINARY AMENDMENT

Commissioner for Patents
Washington, DC 20231

Dear Sir:

Please amend this application as set forth below.

IN THE SPECIFICATION:

Page 1, lines 8-10, delete the sentence that was inserted in that location and replace it with the following:

This is a continuation of United States Patent Application Serial No. 08/240,877 filed May 11, 1994, which is a division of Application No. 07/981,244, filed November 25, 1992 (now U.S. Patent No. 5,325,892), which is a continuation-in-part of Application No. 07891,289, now abandoned.

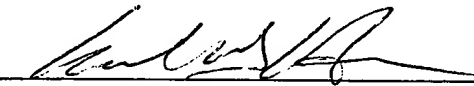
REMARKS

You will find attached a copy of the first page of a Transmittal Letter that was filed in this application. As the Transmittal Letter indicates, applicants indicated that this application was a "divisional" of prior pending application 08/240,877 filed on May 11, 1994. Rather than checking the "divisional" box, applicants should have indicated that the present application is a "continuation" application. This same error was made in the Preliminary Amendment dated October 3, 2000. In addition, the Examiner should note that items 1 and 3-8 noted in the Information Disclosure Statement mailed February 15, 2001 are also continuation applications rather than divisional applications. Accordingly, the present application and the other noted copending cases should be considered to be continuation applications rather than a divisional applications and the claim to priority in this case should be corrected.

Registration Number	Telephone Number
32,900	651-736-7776
Date May 14, 2001	

Respectfully submitted,

By


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